



**IN THE UNITED STATES DISTRICT COURT  
FOR THE NORTHERN DISTRICT OF GEORGIA  
ATLANTA DIVISION**

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**DONNA CURLING, et al.**

**Plaintiffs,**

**v.**

**BRAD RAFFENSPERGER, et al.**

**Defendants.**

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**CIVIL ACTION FILE NO.:  
1:17-cv-2989-AT**

**EIGHTH DECLARATION OF PHILIP B. STARK**

**PHILIP B. STARK** hereby declares as follows:

1. This statement supplements my declarations of September 9, 2018; September 30, 2018; October 22, 2019; December 16, 2019; August 23, 2020; August 31, 2020; and September 13, 2020. I stand by everything in the previous declarations.
2. Defendants' expert Dr. Juan Gilbert makes a number of false or misleading claims about ballot-marking device (BMD) systems, voter verification of BMD printout, and hand-marked paper ballots in his declaration of July 16, 2021 (the "July 2021 Gilbert Report"). I address some of them here.
3. Dr. Gilbert claims that the 2018 National Academies report, *Securing the Vote: Protecting American Democracy*, does not distinguish between the

trustworthiness of ballot-marking device printout and that of hand-marked paper ballots. July 2021 Gilbert Report, at ¶7. That is false: see my declaration of 19 December 2019, at ¶24.

4. The July 2021 Gilbert Report repeats a “red herring” argument that the rate at which voters verify hand-marked paper ballots has not been studied well. July 2021 Gilbert Report, at ¶8. That rate has no bearing on the trustworthiness of BMD printout. With hand-marked paper ballots, there is no possibility whatsoever that misconfiguration or malware will cause the voter’s pen to write the wrong selections on the ballot. In contrast, no matter how carefully a voter makes selections on a BMD, the BMD can print something else. With hand-marked paper ballots, the voter is responsible for the voter’s mistakes. With ballot-marking devices, the voter is responsible for catching and correcting the BMD’s mistakes and malfunctions. Hand-marked paper ballots are a record of what the voter did; BMD printout is a record of what the machine did. They are not comparable. BMDs make voters responsible for checking whether key, vulnerable parts of the voting system are functioning correctly. Hand-marked paper ballots do not.
5. Paragraph 12 of the July 2021 Gilbert Report appears to be pure speculation addressing a straw-person argument. Plaintiffs have not alleged that the 2020 presidential election outcome in Georgia was altered by BMDs, which appears

to be what Dr. Gilbert is rebutting. Regardless, Dr. Gilbert does not cite any data on the number of spoiled ballots or voter complaints that BMDs misprinted votes in Georgia in November, 2020. To the best of my knowledge, there is no evidence about how many voters in Georgia requested a fresh chance to mark a BMD ballot in the November, 2020, election, nor of how many complained to poll workers that BMDs did not print their votes correctly. There might have been thousands of voters who found errors in the BMD printout and reported it. Dr. Gilbert has provided no basis for his claim that there were not. Moreover, as elaborated in my other declarations, the fundamental design flaw of all ballot-marking devices is that even if a voter catches the ballot-marking device misprinting selections, there is no way the voter can prove it to anyone else. Conversely, if a voter complains to a poll worker or election official that a ballot-marking device changed the voter's selections, there is no way for the poll worker or election official to tell whether the voter is telling the truth, mistaken, or lying.

6. Since my last declaration, A.A. Haynes and M.V. Hood III published a report entitled "Georgia Voter Verification Study," which I understand was sponsored by the Georgia Secretary of State's office.<sup>1</sup> The study examined

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<sup>1</sup> <https://s3.documentcloud.org/documents/21017815/gvvs-report-11.pdf>, last visited 31 July 2021.

how long voters reviewed their BMD printouts in November, 2020, in 31 randomly selected precincts in six Georgia counties: Barrow, Clarke, Jackson, Madison, Oconee, and Oglethorpe. The study, dated January 22, 2021, was not published; its existence was discovered through a Georgia Open Records Act request by *The Atlanta Journal Constitution*.<sup>2</sup> Dr. Gilbert does not mention this study.

7. The results of the Haynes and Hood (2021) study are summarized in the table below. Less than 19 percent of voters looked at the BMD printout for 5 seconds or more.

Duration of glance	Percentage of voters
did not look at all	20.0 percent
less than one second	31.3 percent
one to five seconds	29.9 percent
five seconds or more	18.8 percent

8. Apparently the study was intended to show that voters *do* review BMD printout, because the maximum observation time was 5 seconds, which the

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<sup>2</sup> Under half of Georgia voters checked their paper ballots, study shows, Mark Kniesse, *The Atlanta Journal Constitution*, 27 July 2021. <https://www.ajc.com/politics/under-half-of-georgia-voters-checked-their-paper-ballots-study-shows/6HSVHHFOBRBDPODRZXLIBTUS64/> last visited 2 August 2021.

authors characterize as a “long time.” Haynes and Hood (2021), at 2. Five seconds is not a “long time” to review a typical ballot in the 2020 general election in Georgia, as I shall explain.

9. Studies of reading report rates of about 138 words per minute to 600 words per minute for college students, depending on the goal.<sup>3</sup> For general tasks, a typical rate is 300 words per minute. For a task with a high cognitive burden—such as noticing whether a contest was omitted or added—rates are lower.
10. I understand that throughout Georgia, 2020 General Election ballots contained many contests: there were five statewide contests, three statewide ballot questions, State House and State Senate races, and county and local issues. Attachment 1 contains images of exemplar ballots from seven Georgia counties and a summary of the contests in Madison County from November, 2020. The ballots and counties were not selected at random, but I understand them to be representative, and they include the six counties in the Haynes & Hood (2021) study.
11. If verifying selections in a contest requires reading at least four words (two for the contest name and two for the selection), at a rate of 138 to 300 words

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<sup>3</sup> Carver, R.P., 1992. Reading Rate: Theory, Research, and Practical Implications, *Journal of Reading*, 36, 84-95. <https://www.jstor.org/stable/40016440>. See Table 1 and pp. 87–89.

per minute, then it should take a voter 0.8 to 1.74 seconds to verify a single contest. This may well be an underestimate of the time required to review contest selections because it does not include the cognitive burden of checking whether a contest was added or omitted, among other things.

12. To review 20 contests requires reading at least 80 words, about 16 seconds at 300 words per minute or 35 seconds at 138 words per minute. That is merely to *read* 4 words per contest: it does not include any allowance for recalling one's intended selections or consulting a sample ballot for reference.

13. The exemplar ballots contain between 16 contests (in Clarke County) and 27 contests (in Oconee County). Five seconds to review 27 contests is 0.185 seconds per contest. But it is expected to take at least 0.8 seconds—more than four times that long—simply to read four words per contest.<sup>4</sup>

14. The number of contests on the exemplar ballots is summarized in the table below, along with an estimate of the time it would take to read 4 words per contest at a rate of either 300 words per minute or 138 words per minute.

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<sup>4</sup> I performed an experiment using myself as a subject: I timed myself counting the contests on the exemplar Georgia BMD printouts in the Appendix, trying to count as quickly as possible. Even though I was familiar with the format and had looked at many examples, it took an average of more than 0.5 seconds per contest merely to *count* the contests—without attempting to read the contest names or the selections.

County	Contests	Minimum estimated time required to <i>read</i> 4 words per contest (seconds)	included in Haynes & Hood (2021)
Barrow	21	17–37	yes
Clarke	16	13–28	yes
Jackson	24	19–42	yes
Madison	23	18–40	yes
Oconee	27	22–47	yes
Oglethorpe	19	15–33	yes
Dougherty	19	15–33	no
Fulton	20	16–35	no

15. I conclude that a voter who reads at the college level cannot reliably read and check every selection on the November, 2020, ballot from any of those counties in 5 seconds. Thus, the results reported in the Haynes and Hood (2021) study do not provide evidence that *any* voter examined the BMD printout carefully enough to detect an error.

16. But even if Georgia voters spent longer reviewing the BMD printout, it is not clear whether they would notice errors introduced by BMD malfunctions or malware. The two studies that have investigated the question, cited in my

declaration of 31 August 2020, suggest otherwise. During oral testimony in September, 2020, I explained that even if voters verified BMD printout at the highest rate studies have attained via interventions, that would not suffice to catch and correct wrong outcomes in contests with small margins. The rate of verification (and corrective action) needs to be essentially 100 percent. Increasing the rate of verification from less than 7 percent to 90 percent would not be enough.

17. But all this analysis is irrelevant in Georgia. That is because in Georgia, tabulation and recounts of BMD printout are based on QR codes, not on the human-readable text. No matter how well voters verify the printed text, they cannot check whether the QR code correctly reflects their selections. Hence, even if all voters reviewed the human-readable selections on BMD printouts perfectly and requested another opportunity to mark a ballot whenever they found discrepancies, Georgia's election system would be completely vulnerable to attacks or errors that alter the QR code but not the human-readable text. To detect that the selections in the QR codes differ from the selections in the human-readable text would require properly conducted audits of *every* contest in *every* election. A risk-limiting audit of one contest every two years is not enough, no matter how rigorous that audit is.

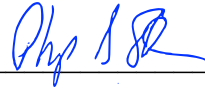


18. The July 2021 Gilbert Report claims, “[s]imply put, BMD elections systems are no more insecure than HMPB systems and, in fact, offer many advantages that make such systems more secure.” July 2021 Gilbert Report, at 7. This is nonsense: BMD systems have the same failure modes as hand-marked paper ballots (e.g., poor/confusing ballot layout; presentation attacks that offer voters the wrong contests or options; loss, addition, alteration, or substitution of voted ballots; hacking or misconfiguration of the scanners or tabulators; erroneous reporting of aggregate results), *and in addition* other failure modes that cannot be detected or corrected reliably in practice (e.g., printing selections that differ from what the voter saw on the screen). Voting using a BMD amounts to marking a ballot with a hackable pen. And in Georgia, where tabulation and recounts are based on the QR codes, voters cannot even tell whether the “pen” wrote something other than they intended.

19. I anticipate supplementing my report when the Election Project files and ballot images for the November election become available from key counties, such as Fulton, Gwinnett, and DeKalb, to cross check key claims of the November, 2020, “hand count audit.”

I declare under penalty of perjury, in accordance with 28 U.S.C. § 1746, that the foregoing is true and correct.

Executed on this date, 2 August 2021.

A handwritten signature in blue ink, appearing to read "Phil B. Stark", is positioned above a horizontal line.

Philip B. Stark